Advanced Java Programming

Week 1 Topic Outline

Introduction to Objects

1. A world of objects
2. States and behaviors
3. Simple object definition (instance variables and methods)
4. Object instantiation and usage (dot operator)
5. Object references / pointers
6. Constructors
    a. single constructor
    b. multiple constructors
7. Field shadowing
    a. shadowing
    b. `this` keyword
    c. invoking other constructors
8. Default values for uninitialized fields
9. Default constructor
10. `null` pointers and `NullPointerException`s

Encapsulation

1. Clients of our classes
2. Reasons for limiting access: maintainability (sanity)
    a. Limit access of others
    b. Limit your own access (protect you from yourself)
3. Protection in methods
4. Need for `private` variables
5. Accessors and Mutators (Getters and Setters)
6. Exposing an "interface"

Class Variables

1. Class members
2. Static keyword
3. Understanding `public static void main(String[] args)`

Inheritance

1. Is-a vs. has-a relationships
2. Subclass / Superclass (child / parent class)
3. Method overriding
4. Protected members
5. Object class
6. Up-casting
7. Polymorphism
8. Down-casting
    a. Checking cast safety with `instanceof`
    b. `ClassCastException`s

Limiting OOP Behaviors

1. Preventing construction
2. Preventing method overriding
3. Preventing subclassing

Abstract Classes and Interfaces

1. Abstract vs. concrete classes
2. Abstract methods and classes
3. Interfaces and can-do relationships
4. Programming to an interface, not an implementation

Javadoc Documentation

1. Javadoc lets us view the "interface" for a class
2. Preconditions and post-conditions
3. Javadoc comments
4. `@author`, `@version`, `@param`, `@return`, `@throws`
5. Generating documentation with the `javadoc` tool
6. Google "javadoc tutorial" for more information